
Maintenance

This chapter describes Meridian Integrated RAN (MIRAN) maintenance tools and procedures to guide you in identifying the MIRAN faults, locating defective equipment, correcting problems by fixing or replacing defective equipment, and verifying the operation of the MIRAN after corrections or replacements have been made.

Maintenance overview

The problem identification should be approached systematically. A problem may have more than one cause. To isolate the cause, a knowledge of MIRAN operation is required. Once the cause is identified, the problem can be corrected by replacing the defective card, connecting accidentally disconnected cables, or correcting the software security problem.

The system and the MIRAN provide built-in self-diagnostic indicators and software and hardware tools. These diagnostic facilities simplify system troubleshooting and reduce mean-time-to-repair (MTTR).

This document focuses on the maintenance of the MIRAN equipment. It requires that system operates correctly before you start diagnosing the MIRAN problems.

The system installation and maintenance guide documents: *Meridian 1 general maintenance information* (553-3001-500), *Meridian 1 fault clearing* (553-3001-510), and *Meridian 1 hardware replacement* (553-3001-520) describe how to maintain the entire system. This chapter describes how to maintain the MIRAN as an integral part of the system.

Diagnostic tools

Diagnostic tools are used to troubleshoot problems in the system including problems with the MIRAN. When diagnosing MIRAN problems, you may have to use more than one of these tools.

System diagnostic tools consist of:

- LED indicators
- display codes
- card self-tests
- sanity monitoring
- overlay commands
- history files

LED indicators

System cards are equipped with red LED indicators and module power supplies are equipped with green LED indicators. These indicators show the status of each card or power supply.

MIRAN maintenance LED indicator. The MIRAN has a card LED indicator at the top of the faceplate. The card LED is a red LED that indicates the status of the card. If the LED is ON, the card may be faulty or disabled. When the card is powered up, it blinks 3 times during self-test and then is stays ON if functioning correctly, otherwise it turns ON without blinking and stays ON. The LED turns OFF when the card is software enabled.

Display codes

The MIRAN is equipped with a 4-digit alphanumeric hexadecimal display on the faceplate.

The hexadecimal display indicates the progress of the internal self-test in the form of T:xx (refer to *Appendix A, MIRAN hexadecimal codes*). Upon successful completion of the test and the start-up of the RAN application, it will display the code “**Rann**”, where **nn** is the LAN card number. If cards are not connected in a LAN configuration the display will show Ra00.

The maintenance display on the MIRAN faceplate provides detailed maintenance information. The display includes the following types of information:

- self-test results on power-up
- maintenance routine results
- upgrade and backup information
- Reading and writing to and from Drives A:, B:, or C:

Self-test

A self-test is automatically performed by each MIRAN card when you insert it into an operating system module, when you enable the card, or when you power up or reset the system. You can also perform a self-test on a card using software commands or menus.

The self-test checks general MIRAN functions and determines if they are operating correctly. It is very useful when you first install the cards because, upon insertion, the card automatically starts the self-test and gives you an immediate indication of its operating status.

Self-test performs a detail test and analysis of the installed hardware both to determine the integrity of the hardware and to establish the configuration of MIRAN card (refer to Table 28). If the detected configuration is different from that stored in the Flash memory, the difference is logged on the maintenance terminal and the Flash configuration information is updated. Results of the self-test may also be displayed on the hex display on the MIRAN faceplate.

Table 28
MIRAN self-test sequence

Item tested	Description of action
Processor/Coprocessor	Read and store processor ID. Run processor self-test.
Onboard Flash memory	Check the amount of Flash installed. Perform checksum testing of diagnostics, application, configuration areas, BIOS, and OS.
DRAM	Check the amount of DRAM installed. Perform R/W test.
PCI Chipset	Perform R/W test on selected registers.
System I/O Controller	Perform R/W test on selected registers.
PCMCIA Controller	Perform R/W test on selected registers.
DS-30X Interface	Test shared memory and perform loopback test over SD-30 LCA.
CE-MUX Interface	Test shared memory and perform loopback test over CE-MUX LCA
PCMCIA DSP card(s)	Check the presence of DSP cards and initiate diagnostic tests on DSP cards, if present.
PCMCIA Flash card(s)	Check the presence of Flash memory and the MIRAN check configuration information.

Sanity monitoring

Sanity monitoring is a background routine that checks the operation of system resources such as CPU activity memory allocation etc. This background routine attempts to restore normal system operation if the system performance has degraded to an unacceptable level. If all else fails, this routine will restart the system to try to restore it to normal operation. If the soft reset is not effective, a full board level reset is initiated. If reset is not successful, the permanent error code is displayed on the MIRAN hex display.

Overlay commands

Diagnostics are performed for every card as part of the daily routines, or may be invoked from a maintenance TTY or the SMP (when equipped). See the NTP titled *Meridian 1 system maintenance* (553-3001-520).

The MIRAN card appears as an Enhanced Universal Trunk card to a system in which it is installed. All relevant system maintenance commands for a Enhanced Universal Trunk card can therefore be used with MIRAN. Enabling and disabling of RAN channels is done in Network and Peripheral Equipment Diagnostics program LD 32. To test the music and RAN device, use the Trunk Diagnostics program LD 36.

Table 29 lists some of the commands used to control the MIRAN status and functions.

Table 29
Commands to enable/disable and test MIRAN channels

Overlay	Command	Operation performed
LD 32	DISC / ENLC	Disable / Enable specified card
LD 32	DISU / ENLU	Disable / Enable specified channel
LD 36	MUS	Test music device for specified customer and route
LD 36	RAN	Test RAN device for specified customer and route
LD 32	STAT	Get status of specified card /channel

All the above commands are handled by the MIRAN card exactly as they are by the Enhanced Universal Trunk card, transparently to the system.

History file

Information on any fault conditions are stored on the MIRAN card to provide a history file for the craftsperson. The file is in the form of a cyclical buffer, which is overwritten from the top when it runs out of space. It is configured to use memory resources efficiently.

The following fault conditions are stored in the history file to provide information for MIRAN maintenance tasks:

- memory resource problems
- unexpected removal of PCMCIA card
- encountering incorrect format files during upgrade (e.g. trying to upgrade application with a voice file or vice versa)
- record of card reset/card enable/disable card, with date- and time-stamp
- receipt of invalid Card LAN, DS-30 or CE-MUX messages

MIRAN fault isolation and correction

Fault clearing procedures for the MIRAN are the same as for other IPE cards; refer to *Meridian 1 fault clearing* (553-3001-510) for more information.

Table 30 deals specifically with MIRAN service problems. To diagnose these problems, the table refers you to the test procedures in this manual that will most likely be able to resolve these problems based on the symptoms these problems are exhibiting.

Table 30
MIRAN equipment problems

Symptoms	Diagnosis	Solution
Red card LED on the MIRAN is permanently on.	Card is disabled or faulty.	Go to <i>Procedure 1</i> , in this chapter to check the card status and perform self-test.
Display on the MIRAN card shows fault codes.	Card faulty, failed self-test or problem communicating with peripheral equipment.	Go to <i>Procedures 1</i> and <i>2</i> to check self-test and self-test on reset. Also refer to <i>Hex codes in Appendix A</i> for a list of error codes. Based on the maintenance display codes description, take the appropriate action and resolve the problem.
Error messages printed on the terminal or the Meridian 1 TTY.	Hardware or software problems with the MIRAN.	Note various error messages. Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of these messages and their description. Based on the code's description, take the appropriate action to resolve the problem.

If you cannot resolve the problem after exhausting all available diagnostic tools and test procedures, make a list of all the symptoms you observed and contact your field service representative. Refer to Appendix A “Codes and interfaces” on page 177 to identify the HEX codes that indicate possible problems with the MIRAN.

Procedure 1

MIRAN self-test steps

- 1** The card will self-test.
- 2** Card LAN will poll the card.
- 3** If self-test passed, the card will send back “powered-up occurred” message.
- 4** Card LAN will request configuration data.

- 5 The card will return configuration data (card type, A07 signaling type, and TN mapping type 2).
- 6 Card LAN will enable the DS-30X signaling channel.
- 7 The MIRAN card will wait until it receives configuration data (trunk type, signaling type, balance impedance, etc.) via the DX-30X, but it will then discard this data.
- 8 The card will go into its main program loop.

Procedure 2

Reset MIRAN card command

- 1 Software will send a reset message to the card if no channels are busy.
- 2 The card will set all appropriate resources to disabled state and turn on the faceplate LED.
- 3 The MIRAN card will reset and self-test. Self-test results will be stored in case a later query is performed by the Meridian 1. Refer to hex codes in Appendix A.
- 4 Card LAN will poll the card.
- 5 If self-test passes, the card will send back a message: "power-up occurred".
- 6 Card LAN will request configuration data.
- 7 The card will return configuration data (card type, A07 signaling type, and TN mapping type 2) and enable DS-30X link.
- 8 Card LAN will enable the DS-30X signaling channel.
- 9 The card will wait until it receives download configuration data (trunk type, signaling type, balance impedance, etc.) via the DS-30X, but it will then discard this data.
- 10 The card will go to its main program loop.

MIRAN fault isolation using the menu system

Refer to "RAN Application: Terminal-based OA&M access" chapter in this manual for details on using the menu system. You will see the Main Menu when you access the terminal-based OA&M. Each option listed on the Main Menu leads to another task screen or submenu.

Main menu

To access the Main Menu, press the Enter key on your terminal. This OA&M screen presents the highest level of end-user maintenance access and provides all functions needed to configure, maintain, and upgrade the MIRAN card.

[10002345]

MAIN MENU

[NT_DISTRIB]

- 1 RAN Administration.
- 2 MIRAN Administration.
- 3 Access other MIRAN Card.
- 4 Maintenance and Diagnostics.
- 5
- 6
- 7
- 8
- 9 Logoff.

```
Choose a Menu Option or 9 to Exit:
MIRAN[00]>
```

To troubleshoot the MIRAN using the menu system, select 4 in the Main Menu and press the Enter key to display the Maintenance and Diagnostics sub-menu.

```
[10002345]          -Maintenance and Diagnostics -          [NT_DISTRIB]

    1  System Information
    2  Password Change
    3  Warm Reboot
    4  Cold Reboot

    9  Back to Previous Menu ...

Choose a Menu Option or 9 to Exit:
MIRAN[00]>
```

Card replacement

The MIRAN is based on Flash EPROM technology. This allows you to remove the MIRAN from the IPE shelf indefinitely without losing the configuration data.

To replace the MIRAN card:

- 1 Disable the MIRAN card by loading the LD 32 overlay and executing the **DISC l s c** command, where **l**= loop, **s**= shelf or module, **c**= card in the module.
- 2 Remove the card from its card slot in the IPE module.

- 3 Remove all PCMCIA cards from the faulty MIRAN card (i. e. the internal PCMCIA card and the PCMCIA cards installed into the MIRAN faceplate slots.
- 4 Transfer the Security Device from the faulty MIRAN to the replacement.
- 5 Transfer all PCMCIA cards to the new MIRAN card.
Note: This procedure moves all software, configuration, and records to the replacement MIRAN card.
- 6 Install the new MIRAN card into the IPE module card slot.
- 7 Enter the same keycode to enable the new MIRAN card.
- 8 Enable the new card by executing the **ENLC l s c** command.
- 9 Configure the newly installed MIRAN card.
- 10 Package the faulty MIRAN card and ship it to the repair center.